

***Periclimenes poupini* sp. nov., a new anemone-associated shrimp
from deep-water traps
(Crustacea, Decapoda, Palaemonidae)**

by A. J. BRUCE

Abstract. — A new species of palaemonid shrimp, *Periclimenes poupini*, obtained from seven deep-sea traps, in association with anemones, from 430-560 m from the islands of Rapa, Tubuai and Gambier, French Polynesia, is described and illustrated. The new species is most closely related to another deep-water species, *P. alcocki* Kemp, first described from the Indian Ocean at 745 m, from which it may be distinguished by the characteristic dactyls of the ambulatory pereopods, which have an unusually long accessory tooth, and a much larger cornea on the eye.

Résumé. — Une nouvelle espèce de crevette palaemonide, *Periclimenes poupini*, associée avec des anémones, a été récoltée dans des casiers mouillés entre 430 et 560 m de profondeur, près des îles Rapa, Tubuai et Gambier, en Polynésie française. Cette nouvelle espèce est décrite et illustrée. Elle est très proche d'une autre espèce, *P. alcocki* Kemp, décrite d'après des spécimens récoltés dans l'océan Indien, à 745 m de profondeur. Elle s'en distingue par les dactyles des périopodes ambulatoires qui possèdent une dent accessoire extrêmement longue et par la cornée de l'œil beaucoup plus grande.

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INTRODUCTION

Palaemonid shrimps are abundant in shallow waters, particularly in tropical regions, and comparatively few are found in deeper waters. Most of those so far reported have been obtained by the use of benthic trawls or dredges and many are known from only single or very small number of specimens, which are also often damaged or incomplete. Recently some specimens have been collected from deep water by means of submersibles (BRUCE, 1986, 1987; BERGGREN & SVANE, 1989), and also a further species, *Periclimenes parvispinatus*, was described from New Caledonian waters, on the basis of a single specimen caught in a deep-water shrimp trap set for pandalid shrimps (BRUCE, 1990).

Similar traps, also set in deep waters, off some Islands of French Polynesia, reported on by POUPIN (*in press*), through the research programme of the Service Mixte de Contrôle Biologique des Armées, from biological control ship "Marara", have provided a number of specimens of a similar but distinct species, which is now described as new. All specimens were collected by M. Joseph POUPIN, in whose honour the species is now named. The specimens are deposited in the collections of the Muséum national d'Histoire naturelle, Paris, with two paratypes in the Northern Territory Museum, Darwin.

Carapace length (CL) refers to the postorbital carapace length.

Periclimenes poupini sp. nov.

(Figs 1-5, 6A)

MATERIAL EXAMINED : (i) 1 ♂, 1 ovig. ♀, Rapa, 27°36' S 144°16' W, 560 m, 27 August 1988, paratypes, NTM. Cr. 006714. (ii) 4 ovig. ♀, Tubuai, 23°19' S 142°22' W, 430 m, 450 m, 510 m, 520 m, 1 September 1988, holotype and 3 paratypes, MNHN Na. 11123. (iii) 2 ovig. ♀, Gambier, 23°02' S 135°00' W, 430 m, 530 m, 5 December 1988, paratypes, MNHN Na. 12540/12541.

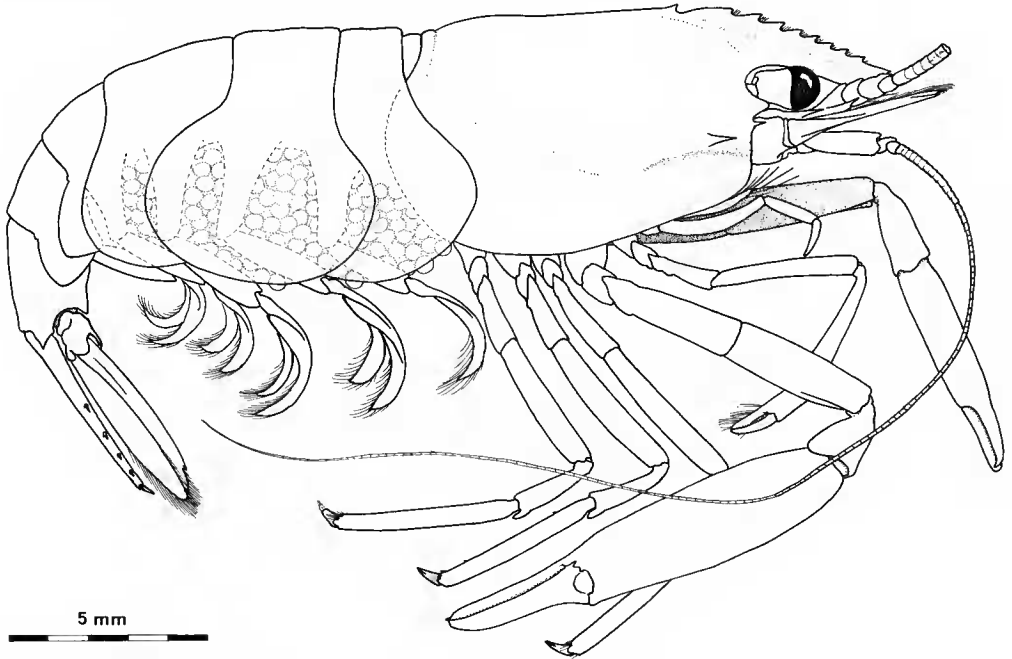


FIG. 1. -- *Periclimenes poupini* sp. nov., holotype female, Tubuai Island. Scale bar in millimetres.

DESCRIPTION

A medium sized, robustly built shrimp of subcylindrical body form.

Rostrum well developed, straight, slightly depressed, feebly upturned distally, reaching to about end of antennular peduncle; dorsal carina well developed, with 7-9 small, evenly spaced, acute teeth, slightly diminishing in size distally, interspaces sparsely setose, second tooth situated over posterior orbital margin, with first on anterior carapace; ventral carina distinct over distal half of rostrum, with 2-3 small acute teeth on distal fourth, distal tooth usually minute, ventral margin very sparsely setose; lateral carinae distinct, feebly developed. Carapace glabrous, mainly smooth, feebly pitted over branchiostegite; epigastric spine present, small, stout, at about 0.2 of carapace length; supraorbital spines absent; orbit feebly developed; anterior orbital angle strongly produced, slightly exceeding antennal spine, without

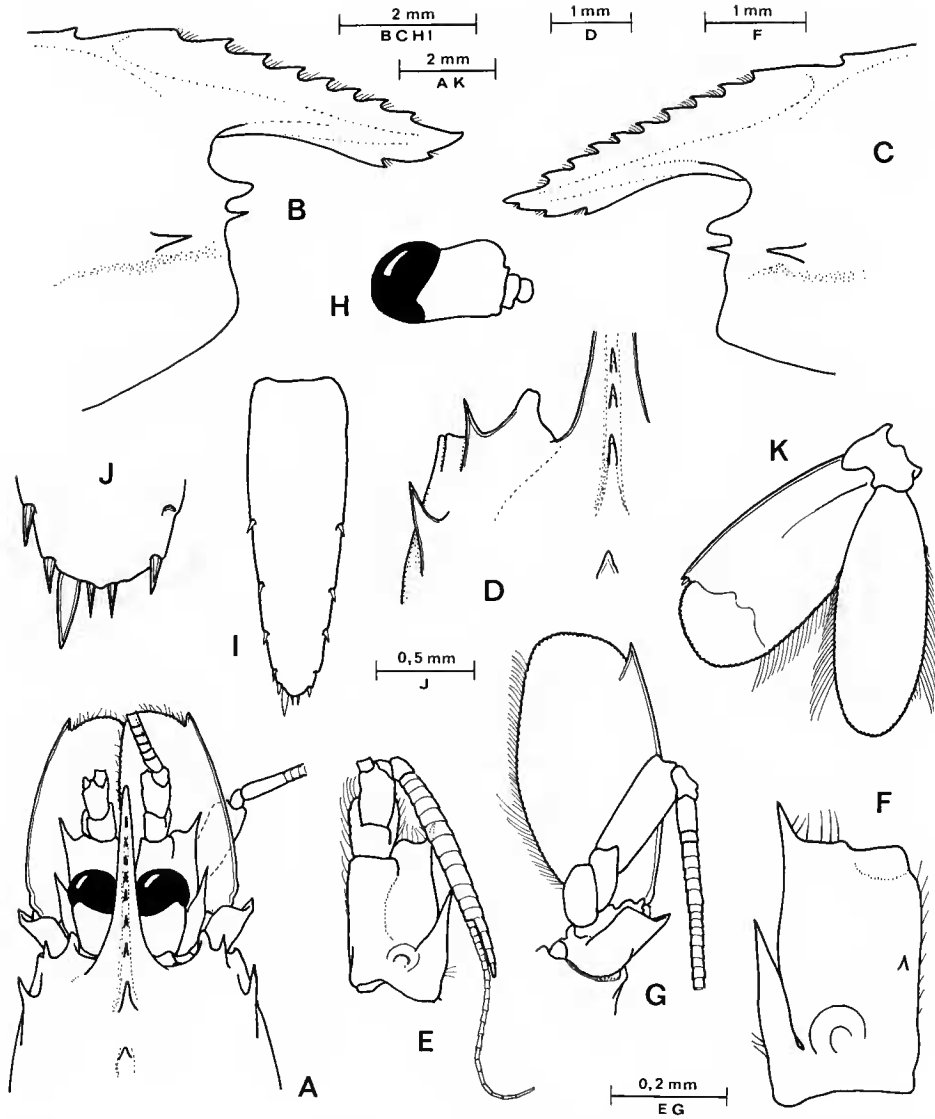


FIG. 2. — *Periclimenes poupini* sp. nov. : A, anterior carapace, antennal peduncles and eyes, dorsal; BC, anterior carapace and rostrum, lateral; D, orbital region, dorsal; E, antennule; F, same, proximal segment, ventral; G, antenna, ventral; H, eye, dorsal; I, telson; J, same, posterior spines; K, uropod. A-B, holotype; C-K, ovigerous female paratype.

inner flange; antennal spine well developed, acute, marginal; hepatic spine large, acute, at slightly lower level than antennal spine, arising slightly posterior to level of first dorsal rostral tooth; anterolateral angle of branchiostegite not produced, blunt; branchiostegal groove present below hepatic spine.

Abdominal tergites smooth, third not posterodorsally produced, fifth about 1.3 times longer than sixth, sixth moderately compressed, about 1.3 times longer than deep; posteroventral angle produced, subacute; posterolateral angle acute; pleura of first three segments broadly rounded, larger in females; pleura of fourth and fifth segments posteriorly produced, blunt; telson about 2.1 times length of sixth segment, about 3.25 times longer than greatest width, at about 0.33 of length, lateral margins feebly convex, posterior margin broadly convex with or without feeble median point; generally with four pairs of small marginal dorsal spines, at about 0.45, 0.66, 0.8, 0.9 (female); 0.45, 0.60, 0.78, 0.91 (male), male with five spines on right side, spines about 0.05 of telson length; posterior spines with lateral spines slightly smaller than dorsal, feebly subdorsal, intermediate spines stout, blunt, 0.1 of telson length, submedian spines short, 0.5 of intermediate spine length, slender, acute, feebly setulose.

Antennule with peduncle slightly exceeding rostrum; proximal segment about 1.75 times longer than wide, distolateral angle strongly produced, with large acute lateral tooth exceeding level of proximal end of distal peduncular segment, stylocerite slender, acute, reaching to about 0.66 of segment length, sparsely setose laterally, statocyst well developed, with subcircular statolith, medial ventral margin with small acute tooth at half length; intermediate and distal segments obliquely articulated, intermediate segment dorsally about 0.25 of proximal segment length, with medial and lateral lamellae; distal segment about 2.0 times longer than broad, 0.5 times proximal segment length; upper flagellum biramous with proximal 12-13 segments fused, shorter free ramus slender, four segmented, longer ramus longer than fused section, filiform, with about 20-22 segments; about 28 groups of aesthetascs present; lower flagellum slender, about 0.6 of carapace length.

Antenna with stout basicerite, with small acute lateral tooth; carpocerite robust, about 2.6 times longer than wide, slightly compressed, reaching to about 0.66 of scaphocerite length; flagellum well developed, about 3.2 times carapace length; scaphocerite well developed, far out-reaching rostral tip, about 2.0 times longer than broad, maximum width at 0.5 of length, lateral margin moderately convex, with stout acute distolateral tooth not exceeding broadly rounded distal margin of lamella.

Eye with globular, well pigmented cornea, without accessory pigment spot; stalk about 1.15 times longer than greatest width, subequal to corneal diameter, slightly constricted distally.

Epistome unarmed. Thoracic sternites moderately broad, including first to third, fourth without slender median process, fourth and fifth with transverse ridges posteriorly, separated by small median notch, posterior sternites unarmed.

Mandible (right) normal, without palp; molar process slender, anterior dorsal surface with carina, with small acute tooth distally, other teeth larger, blunt; incisor process normal, obliquely truncate distally with three acute teeth, central tooth smallest, larger lateral tooth with small accessory denticle. Maxillula with bilobed palp, lower lobe small, with ventral tubercle with short simple seta; upper lacinia normal, with about 8 short stout, simple spines and several setae; lower lacinia short, slender, tapering, with numerous serrulate spiniform setae. Maxilla with simple, tapering, distally angulate palp, basal endite deeply bilobed, upper

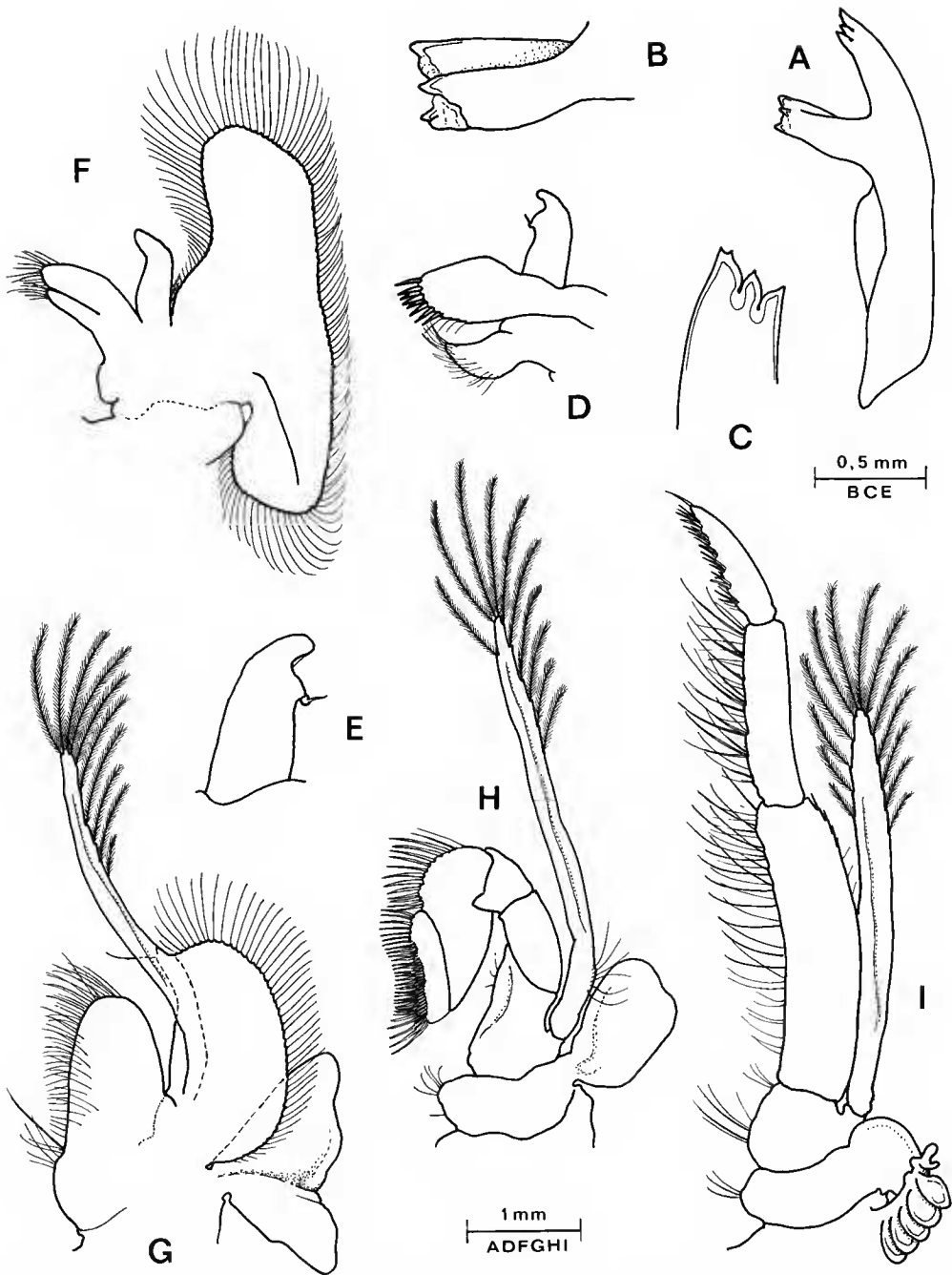


FIG. 3. — *Periclimenes poupini* sp. nov., ovigerous female paratype : A, mandible; B, molar process; C, incisor process; D, maxillula; E, same, palp; F, maxilla; G, first maxilliped; H, second maxilliped; I, third maxilliped.

lobe larger than lower, lobes sparsely setose, with about 15, 10 finely serrulate setae respectively, coxal endite obsolete, medial margin convex; scaphognathite large, broad, about 2.5 times longer than central width, anterior lobe broad, with medial margin concave, posterior lobe broadly rounded. First maxilliped with slender, elongate palp, with short setulose preterminal setae; basal endite broad, elongate, sparsely setose along distal and medial margins; coxal endite distinct, medial margin broadly convex, sparsely setose, with one larger setulose seta; exopod with well developed, broad flagellum with numerous plumose setae distally, caridean lobe large, broad; epipod large, triangular, bilobed. Second maxilliped with normal endopod, dactylar segment narrow, with multiple rows of spinulate spines medially, propodal segment large, distolateral margin broadly rounded with about 13 long marginal spines, carpus, ischiomerus and basis normal, coxa angularly produced medially, sparsely setose; exopod with flagellum well developed, broad, with numerous plumose setae distally, sparsely setose proximolaterally; epipod large, subrectangular, without podobranch. Third maxilliped with moderately slender endopod, reaching distally to about middle of carpocerite; ischiomerus about four times longer than broad, compressed, uniform with four small spines along distolateral margin, medial margin with numerous long slender setae, finely serrulate distally; penultimate segment about 0.66 of proximal segment length, subcylindrical, about 4.0 times longer than wide, subuniform, with 7-8 groups of short serrulate spines medially; basis distinctly articulated with ischiomerus, medial margin broadly convex, sparsely setose; exopod well developed, flagellum broad, with numerous plumose setae distally; coxa feebly produced medially, sparsely setose, with oval lateral plate, small multilamellar arthrobranch.

First pereopods moderately slender, exceeding scaphocerite by length of fingers; chela with palm about 2.4 times longer than deep, uniform, slightly compressed, with three groups of short serrulate cleaning setae proximally; fingers about 0.85 of palm length, dactylus about 4.0 times longer than proximal depth, with small hooked tip, cutting edge entire, sharp, unarmed, feebly laterally situated, fixed finger similar, about 3.4 times longer than proximal depth, both fingers with several groups of rigid setae; carpus about 1.2 times length of chela, about 6.0 times longer than distal width, slightly tapered proximally, with 7-8 serrulate cleaning setae distally; merus slightly longer than carpus, uniform, feebly bowed, about 6.75 times longer than central width; ischium compressed, about 0.5 of merus length, about 2.4 times longer than greatest width; basis short, about 0.35 of merus length; coxa robust, with small setose distoventral process.

Second pereopods well developed, markedly unequal, dissimilar, generally similar in male and female. Major chela in male about 1.35 times carapace length, 1.42 times minor chela length; in female 1.30 times carapace length, 1.85 minor chela length; palm subcylindrical, slightly swollen centrally, feebly compressed, finely covered with small acute tubercles, about 3.2 times longer than central depth; dactylus about 0.5 of palm length, about 4.5 times longer than proximal depth, strongly subspatulate with thin lateral expansion, cutting edge with distal half sharp, entire, with small acute tooth proximally, proximal portion with large, compressed, slightly recurved, acute tooth, opposing into fossa on fixed finger, tip slightly swollen with very acute terminal tooth; fixed finger broader, feebly spatulate, distal half of cutting edge sharp, entire, proximal portion with two large blunt teeth, opposing laterally to dactylar tooth, distal cutting edge separated by distinct notch from short acute unguis; carpus short, stout, distally expanded, about 0.25 of palm length, about 1.3 times longer than distal width, ventral surface

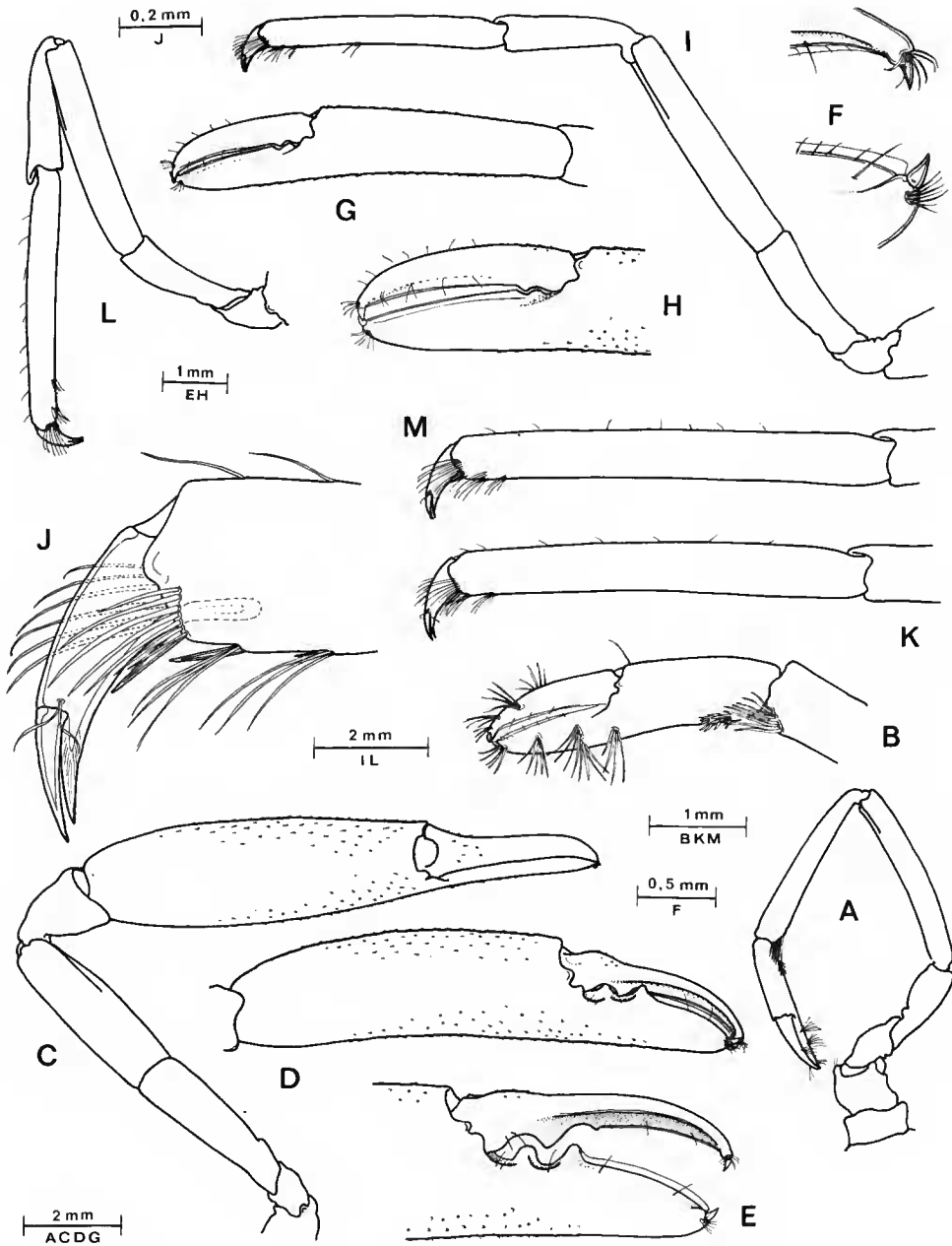


FIG. 4. — *Periclimenes poupini* sp. nov., ovigerous females : A, first pereiopod; B, same, chela; C, major second pereiopod; D, same, chela; E, same, fingers; F, same, tips of fingers; G, minor second pereiopod, chela; H, same, fingers; I, third pereiopod; J, same, propod and dactyl; K, same, dactylus; L, fifth pereiopod; M, same, propod and dactyl. C-H, holotype female; AB, I-M, ovigerous female paratype.

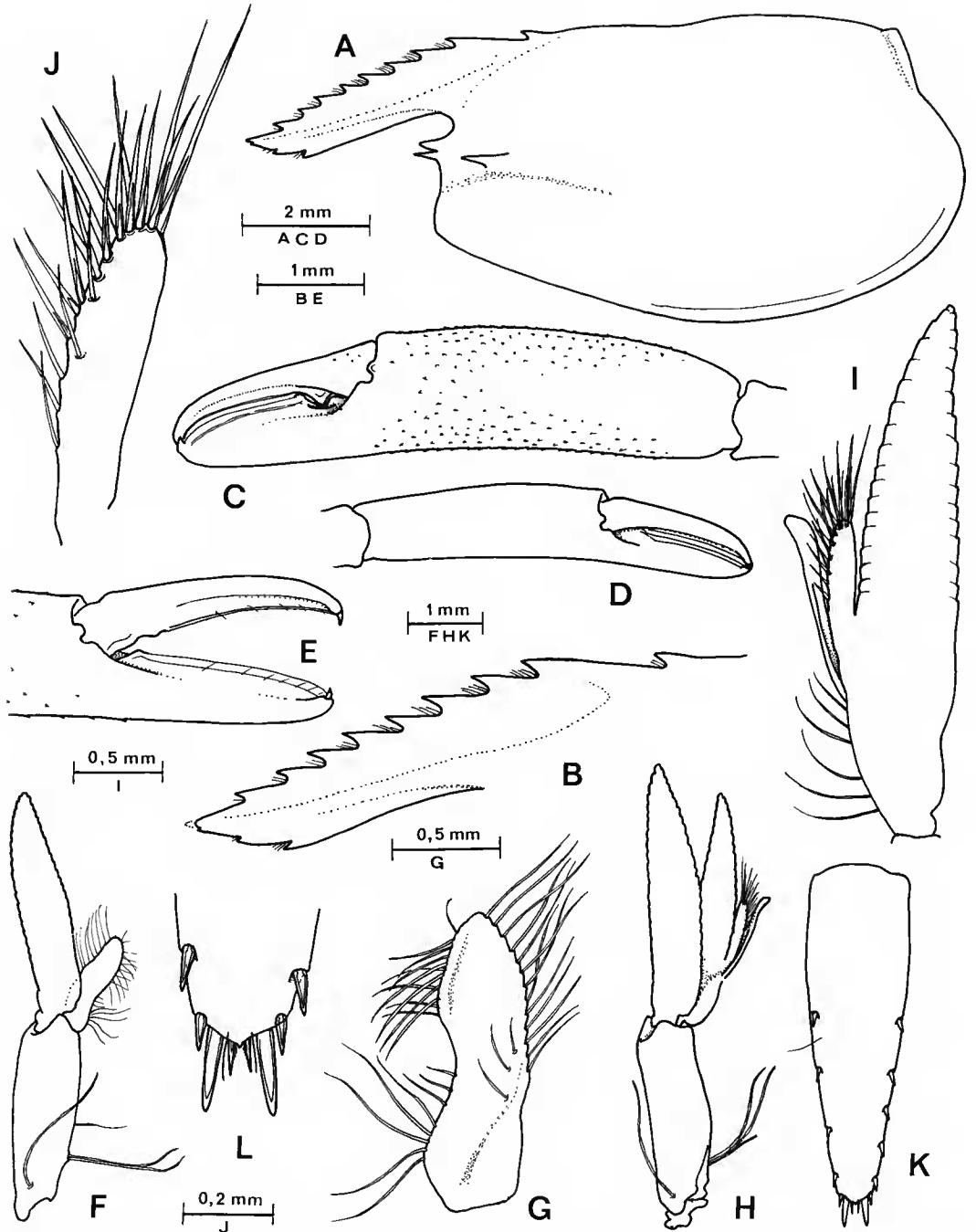


FIG. 5. — *Periclimenes poupini* sp. nov., male paratype : A, carapace and rostrum, lateral; B, rostrum; C, major second pereiopod, chela; D, minor second pereiopod, chela; E, same, fingers; F, first pleopod; G, same, endopod; H, second pleopod; I, same, endopod; J, same, appendix masculina; K, telson; L, same, posterior spines.

feebly tuberculate, distal margins unarmed; merus robust, about 0.5 of palm length, 3.0 times longer than central depth, distoventral angle unarmed, ventral margin feebly tuberculate, ischium subequal to merus length, about 3.4 times longer than distal width, slightly tapered, compressed proximally, unarmed; basis and coxa normal. Minor second pereopod about 0.7 of carapace length in female, 0.95 in male; palm about 3.75 times longer than distal width in female, 3.4 in male, slightly tapered proximally, generally covered with small acute tubercles; fingers with feebly laterally situated cutting edges, with small, acute hooked tips, dactyl about 0.55 of palm length in female, 0.65 in male, about 4.2 times longer than proximal depth, distal three fourths of cutting edge sharp, entire, with feeble tooth proximally; fixed finger broader, with distal 0.9 of cutting edge entire, sharp, with small acute tooth proximally; proximal segments similar to major chela, less robust.

Third pereopod exceeding scaphocerite by distal 0.4 of propod, sparsely setose; dactylus about 0.18 of propod length, unguis clearly distinct from corpus, slender, about 4.0 times longer than proximal width, 0.6 of corpus length, unarmed; corpus compressed, about 3.5 times longer than distal width, slightly tapering distally, with very large distal accessory tooth, reaching almost to tip of unguis, slightly splayed laterally, distal ventral margin sharp, proximally blunt, with pairs of short setae distolaterally and distomedially; propod about 0.5 of carapace length, about 7.6 times longer than proximal width, feebly tapering distally, distal eighth with distoventral pair of simple spines, two single smaller ventral spines only, distoventral propod with transverse rows of simple setae medially and laterally; carpus about 0.95 of propod length, 4.0 times longer than distal width, slightly tapered proximally; merus about 0.95 of propod length, uniform, 6.0 times longer than central width, distoventral angle unarmed; ischium about 0.55 of merus length; basis and coxa without special features. Fourth and fifth pereopods similar, propods subequal to third, fifth propod with single distoventral and ventral spine only, with more numerous transverse rows of setae; dactyls similar to third pereopod.

Male first pleopod with endopod about 0.5 of exopod length, lateral margin convex, distal 0.6 with 13 short plumose serae, medial margin centrally concave, proximal half with five plumose setae and three spiniform setae, distal 0.4 with about 12 short feebly spinulate setae; basipodite with pair of long tubular setae ventromedially proximally, similar seta proximodorsally. Male second pleopod with basipodite similar to first pleopod, with group of three tubular setae proximomedially; endopod about 0.9 of exopod length, with appendices at 0.25 of medial margin length; appendix interna slightly longer than appendix masculina, with few distal cincinnuli; appendix masculina corpus about 4.0 times longer than width, with about 20 simple setae along distomedial margin, longer setae distally, about 0.75 of corpus length.

Uropod with posterolateral lobe of protopodite blunt; exopod distinctly exceeding telson, broad, about 2.2 times longer than greatest width, lateral border feebly convex with small acute tooth distally, with small, longer mobile spine medially; endopod subequal to exopod length, about 2.75 times longer than wide.

Ova numerous, normal size.

MEASUREMENTS (mms) : Holotype, ovigerous female, carapace and rostrum, 11.8, postorbital carapace, 8.1; total body length (approx.), 30.0; major chela, 10.5; minor chela, 5.5. Paratype, male, carapace and rostrum 10.2; postorbital carapace length, 6.9; major chela 9.0; minor chela 6.2. Ovigerous female paratypes, 6.25-9.5. Length of ovum, undeveloped, 0.5; developed, 0.65.

COLOURATION : Uniform pale yellow-orange, without special markings (from colour photograph, J. POUPIN).

HOST : The collector has reported that the shrimps are associated with an unidentified anemone present on the gastropod shells occupied by a hermit crab, *Trizopagurus* sp. nov., caught in the traps, to be described by Prof. J. FOREST.

ASSOCIATED FAUNA : *Plesionika* spp., *Heterocarpus* spp., *Cyrtomaia*, *Progeryon* and *Hypsophrys* spp.

SYSTEMATIC POSITION : *Periclimenes poupini* is most closely related to *P. alcocki* Kemp, 1922, first reported from the Laccadive Sea, at 9°34'57" N 75°36'40" E, at a depth of 745 m. The general form of the body and second pereiopods are closely similar in both species, which also share the unusual feature, for the genus *Periclimenes*, of having four pairs of dorsal spines on the telson. KEMP does not illustrate the dactyl of the ambulatory pereiopod of *P. alcocki*, but states that it is similar to that of *P. laccadivensis*, which has a small accessory claw (KEMP, 1922 : 153, fig. 20c). This contrasts strongly with the unusually large accessory tooth present in *P. poupini*, which is almost as long as the unguis and with which it also lies in close apposition, and is also characteristically deflected laterally from the plane of the dactylus. Also, in comparison with *P. alcocki* (fig. 6B), the rostrum of *P. poupini* is shorter, not exceeding the

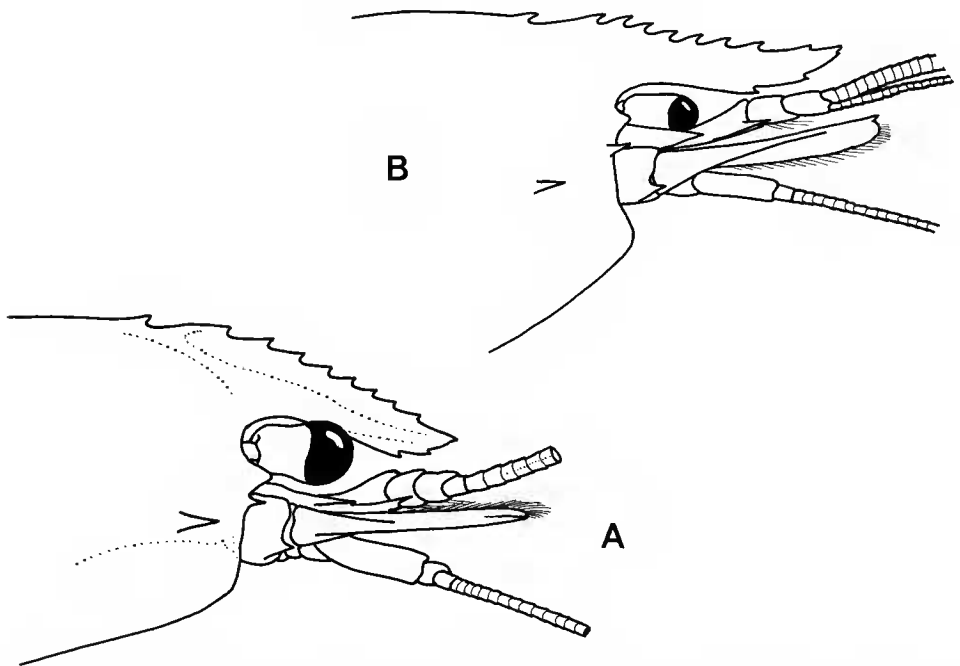


FIG. 6. — Lateral aspect of anterior carapace, rostrum, antennal peduncles and eyes : A, *Periclimenes poupini* sp. nov., ovigerous female; B, *Periclimenes alcocki* Kemp, ovigerous female (after KEMP, 1922).

antennular peduncle, more depressed, and less distally upturned. A more conspicuous difference is on the size of the cornea, which is well developed in *P. poupini* but distinctly reduced in *P. alcocki*. The details of *P. alcocki* from Japanese waters, at 310 m, provided by KUBO (1940), confirms the information given by KEMP (1922) and the differences between it and *P. poupini*.

DISCUSSION

The first report of a palaemonid shrimp from a deep-water trap is given in CHACE (1972), who reports the collection of the Atlantic species, *Periclimenes findlayi*, in mollusc traps set at 165 and 174 m off Saint Lucia, in the Windward Islands. A single example of an unidentified *Periclimenes* was recorded by KING (1984) from shrimp traps set at 250 m off Tonga. The specimen unfortunately lacked second pereopods and could not be precisely identified. Recently, a single example of a further species, *Periclimenes parvispinatus*, was collected from New Caledonian waters, at a depth of 200 m (BRUCE, 1990).

Periclimenes alcocki, *P. parvispinatus* and *P. poupini* all appear to be quite closely related species, but not closely related to the Atlantic species, *P. findlayi*. They are also quite closely related to several other of the deep-water *Periclimenes* species, such as *P. foveolatus*, *P. foresti*, *P. coriolis*, and to a lesser extent, *P. latipollex* and *P. laccadivensis*. *P. poupini* may be readily separated from all these by the insertion of the following couplet in the key provided by BRUCE (1990). The association of *P. poupini* with an anemone suggests that some of these species may be involved in similar relationships.

- 12. Telson with two pairs of dorsal spines only 13
- Telson with four pairs of dorsal spines 12a
- 12a Accessory tooth of ambulatory dactyl much shorter than unguis; cornea distinctly reduced; R. 1 + 8/3 *P. alcocki* Kemp, 1922
- Accessory tooth of ambulatory dactyl almost as long as unguis; cornea large, globular, not reduced; R. 1 + 7-9/3 *P. poupini* sp. nov.

A remarkable feature of *P. poupini* is the presence, on the basipodites of the male pleopods, of long tubular setae. These show a close resemblance to the ovigerous setae normally found in adult female shrimps, but not developed in males. The presence of such setae may suggest the existence of protandrous hermaphroditism in this species, a phenomenon not known to occur in deep or shallow-water palaemonid shrimps.

Acknowledgements

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ADDENDA

Through the kindness of Dr. C. H. J. M. FRANSEN, it has recently been possible to examine the *Periclimenes* specimen caught in a trap at 250 m in Tongan waters and reported in KING (1984). Apart from the lack of second pereiopods, the specimen, a male with a postorbital carapace length of 8.7 mm, is in perfect condition. It has a comparatively reduced cornea, simple dactyls on the ambulatory pereiopods, with two pairs of dorsal telson spines, and generally shows a close resemblance to *P. foresti* Bruce. It is clearly distinct from the other *Periclimenes* species so far known from deep-sea shrimp traps, *P. parvispinatus* Bruce, and *P. poupini*, described above, as both these species have biunguiculate dactyls on the ambulatory pereiopods. The specimen appears to belong to an undescribed species of *Periclimenes* as it differs from *P. foresti* in having a much more strongly developed hepatic spine, situated at a lower and more anterior level, with a smaller antennal spine (fig. 7A). The propod and dactyl of the third pereiopod (fig. 7B) are essentially the same as in *P. foresti*.

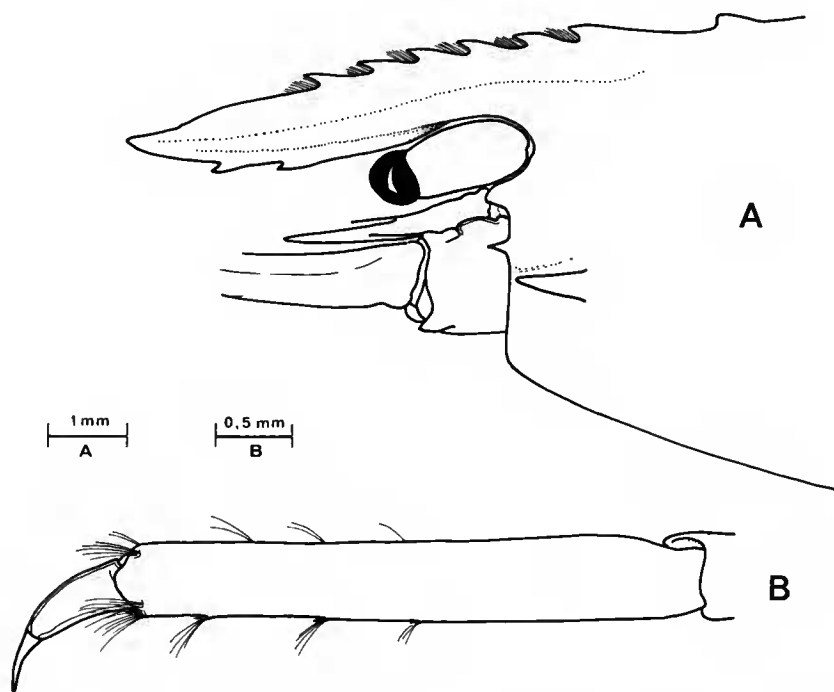


FIG. 7. — *Periclimenes* sp., Hakau Mama'o, Nukualofa, Tonga : A, anterior carapace and rostrum; B, third pereiopod, dactyl and propod.